Multispectral hyperangular polarimetric observations for ocean color retrievals

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Polarimetric measurements of the linear polarization state of light were carried out over a variety of conditions by NRL aircraft and research vessels to study aerosol and water column properties and to investigate the retrieval of additional water parameters using a multispectral, hyperangular imaging polarimeter. The instrument [1], the Versatile Imager for the Coastal Ocean (VICO), is similar to the Hyper-Angular Rainbow Polarimeter [2] planned to be deployed with the the NASA Plankton, Aerosol, Cloud, and ocean Ecosystem mission. Several sets of images at different viewing angles from the visible to the near-infrared spectrum were collected and compared with simulations using a vector radiative transfer code. The simulations were obtained based on measured seawater inherent optical properties and atmospheric parameters at several locations. Results from VICO and the simulation are consistent for both radiance and polarization for all the available viewing angles. This comparison provides an opportunity to investigate various relationships between the microphysical properties of the ocean and atmosphere particulates, such as refractive index and particles size properties of non-algal particles. It also provides an opportunity for validation of the retrieval of ocean color parameters. Uncertainty analysis of the retrievals are also discussed.

References

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[2] Hasekamp, O. P., G. Fu, S. P., Rusli, *et al*., 2019: Aerosol measurements by SPEXone on the NASA PACE mission: expected retrieval capabilities. *J. Quant. Spectrosc. Radiat. Transfer* **227**, 170–184.

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